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WOOD ANATOMY OF THE NEOTROPICAL SAPOTACEAE: VII. CHRYSOPHYLLUM. (U)
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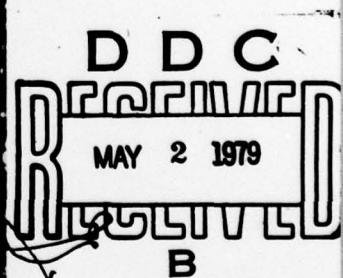
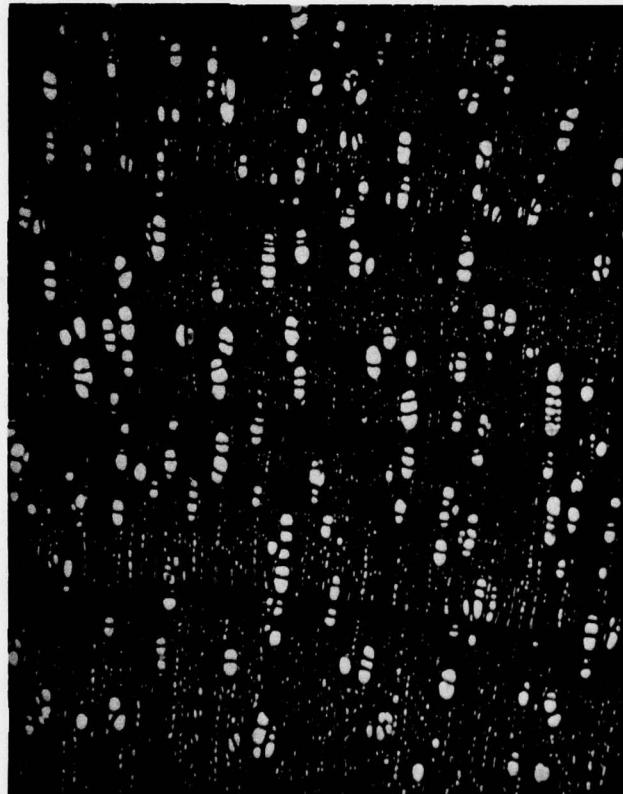
WOOD ANATOMY
OF THE
NEOTROPICAL SAPOTACEAE

VII. CHRYSTOPHYLLUM

RESEARCH PAPER FPL 331

FOREST PRODUCTS LABORATORY
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
MADISON, WIS.

1978



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Preface

The Sapotaceae form an important part of the ecosystem in the neotropics; for example, limited inventories made in the Amazon Basin indicate that this family makes up about 25% of the standing timber volume there. This would represent an astronomical volume of timber but at present only a very small fraction is being utilized. Obviously, better information would help utilization--especially if that information can result in clear identification of species.

The Sapotaceae represent a well-marked and natural family but the homogeneous nature of their floral characters makes generic identification extremely difficult. This in turn is responsible for the extensive synonymy.

Baehni and Bernardi state the situation with respect to Peru but this would hold equally well for all of the neotropics: "For instance, of the 39 species and one variety described hereunder, 13 are known only from the Peruvian type; and 23 taxa here presented have no fruit or seed. It is universally admitted that the taxonomy of this family is almost impossible without--for the same species--leaves, flowers, fruits, and seeds."

Unfortunately, species continue to be named on the basis of flowering or fruiting material alone and this continues to add to the already confused state of affairs.

This paper on Chrysophyllum is the seventh in a series describing the anatomy of the secondary xylem of the neotropical Sapotaceae. The earlier papers, all by the same author and under the same general heading, include:

- I. *Bumelia*--Research Paper FPL 325
- II. *Mastichodendron*--Research Paper FPL 326
- III. *Dipholis*--Research Paper FPL 327
- IV. *Achrouteria*--Research Paper FPL 328
- V. *Calocarpum*--Research Paper FPL 329
- VI. *Chloroluma*--Research Paper FPL 330

Publication in this manner will afford interested anatomists and taxonomists the time to make known their opinions and all such information is hereby solicited. At the termination of this series the data will be assembled into a single comprehensive unit.

(6) WOOD ANATOMY OF NEOTROPICAL SAPOTACEAE:

VII. CHRYSOPHYLLUM

A068034

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By

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Abstract

In the neotropics, the genus Chrysophyllum consists of C. cainito and a number of species which have recently been assigned to the genus Cynodendron. Many taxonomists have not accepted the new genus Cynodendron and this is supported by the present study of the wood anatomy. In this restricted sense, Chrysophyllum consists of a group of closely related species that are readily identifiable by their anatomical structure.

(9) Forest Service Research papers

Introduction

Chrysophyllum, in the widest sense, consists of a large number of species of pan-tropical distribution. The accepted type species, Chrysophyllum cainito L. was established in 1753 and since that time the genus has grown in numbers with a corresponding increase in complexity. Cronquist (5,6) maintained 40 species native to the Americas after excluding a number of species considered to belong to the genera Ecclinusa, Oxythecia (Neoxythecia), and Pradosia. However, his treatment has species which are now regarded as belonging to Chloroluma and Prieurella.

Aubreville (1,2) regarded Chrysophyllum cainito L. as monotypic in the Americas and segregated about a dozen genera, some old and some newly described, from the old genus Chrysophyllum. The remaining species of "true" Chrysophyllum in the Americas were placed in the new genus Cynodendron created by Baehni (3), which is based on the type species Cynodendron oliviforme (L.) Baehni. Baehni (3) in his "Inventory of

1/ Pioneer Research Unit, FPL. The Laboratory is maintained at Madison, Wis. in cooperation with the University of Wisconsin, Madison.

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the Genera" maintained Chrysophyllum cainito L. as the type of his pan-tropical Chrysophyllum and reduced to synonymy practically all the genera which previously had been excluded by Cronquist and Aubreville.

Apparently the taxonomic difference between Chrysophyllum cainito and the species assigned to Cynodendron lies in the character of the fruit: that of cainito being several-seeded while those of Cynodendron are one-seeded.

Baehni and Bernardi (4) state "For specimens devoid of fruit, the identification of Cynodendron and Chrysophyllum will always be hypothetical." This is perhaps the best taxonomic summation of the current problem.

From the anatomical standpoint, the first generic description of the American species was by Record (7); this description is very brief and apparently confused because of the inclusion of several, now-excluded genera.

The present anatomical description is based on wood specimens of Chrysophyllum canito and the species assigned to Cynodendron by Aubreville and Baehni. From the standpoint of wood anatomy the species investigated form a very closely related group which is readily identifiable. The small differences encountered are quantitative only and well within the range of variability to be expected within any given genus. No feature or combination of features was found in the anatomy of Chrysophyllum cainito that would separate it from the species that have referred to Cynodendron. Because of the close anatomical relationship and because Chrysophyllum cainito L. is the type species, the generic name Chrysophyllum is adopted here, which is in accord with most American taxonomists.

Description

Based on specimens of acreanum, argenteum, auratum, cainito, marginatum, mexicanum, oliviforme, ovale, panamense, and revolutum (table 1).

General: Wood gray to light brown; without luster. No distinction in color between heartwood and sapwood. Growth rings distinct in oliviforme and marginatum but obscure or indistinct in other species (fig. 1). Sometimes apparently demarcated by zones which are relatively free of parenchyma. Wood heavy with a specific gravity range of individual specimens from 0.60 to 1.04 with an overall average of 0.88.

Anatomical:

Pores essentially diffuse (figs. 1,5,7) but with a tendency toward radial-echelon arrangement in marginatum (fig. 3). Pores commonly in radial multiples of 2-4 and occasionally to 6; rarely longer. Maximum pore diameter of individual specimens ranges from 79 to 197 μm : smallest in acreanum (79 μm , fig. 5), largest in auratum and cainito (197 μm , fig. 7).

Vessel member length averages 700 μm for all species; shortest average in marginatum (530 μm) and longest in oliviforme (820 μm).

Tyloses commonly thin-walled but frequently thick-walled or sclerotic in the denser specimens. Very large crystals were observed in the tyloses of most specimens but were not seen in the specimens of acreanum, argenteum or marginatum. Inter-vessel pit-pair diameter 6-8 μm in acreanum, argenteum, and marginatum; 8-10 μm in other species. Perforations simple.

Axial parenchyma typically reticulate (figs. 2,4,6,8); the cells characteristically without colored contents, crystals, or silica.

Wood rays 1-3(4) seriate; heterocellular. Vertical fusions common. The maximum body height of the 2-4 seriate portion ranges from 79 to 710 μm ; very inconsistent even within species and of no diagnostic value. Vessel-ray pitting irregular in shape and size. Silica common in the wood rays and commonly confined to cells with yellow-brown contents. The silica particles are commonly spheroidal or sometimes irregular (clinker), ranging in size from maxima of 8 to 30 μm in different specimens (table 2). The larger particles are frequently of the clinker type. A few crystals were observed in the wood rays of two specimens of oliviforme.

Wood fibers thick-walled; the fiber length averages for the different specimens range from 1.22 to 2.10 mm with an overall generic average of 1.64 mm. Vascular tracheids few to rare and not observed in the macerated material of many specimens.

One specimen of mexicanum (Skutch 1333) cited by Cronquist (5) apparently does not belong here because of the presence of two-sized crystals and microcrystals which are frequent in the axial parenchyma and wood rays. The characters would suggest Mastichodendron but the presence of silica in the wood rays and the large inter-vessel pitting rule out the latter. According to Cronquist, herbarium material is deposited at A, F, NY, and US.

Diagnostic features: Wood gray or light brown; heavy. Essentially diffuse-porous with reticulate parenchyma. Wood rays with silica. Axial parenchyma free of contents.

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Wood anatomy of neotropical Sapotaceae:
 VII. Chrysophyllum, by B. F. Kukachka. Res.
 Pap. FPL 331, FPL, For. Serv., USDA. 9 p.
 Madison, Wis.

In neotropica, the genus Chrysophyllum consists of C. cainito and a number of species recently assigned to the genus Cynodendron. Many taxonomists have not accepted the new genus, and the present study of wood anatomy supports the question. In this restricted sense, Chrysophyllum consists of closely related species readily identifiable by their anatomical structure.

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Table 1.--Wood specimens of Chrysophyllum examined

Species	Collector and number	Origin	Number of wood collection	
			MADw	SJRw***
<i>acreanum</i> M. A. C. Smith	Krukoff Krukoff	5593(TYPE) 8254	Brazil Brazil	9833 31998
<i>argenteum</i> Jacq.	Forest Dept. Leonard Stern-Wasshausen Stoffers	283 2535 2389 127	Trinidad Haiti Dominica Curacao	16800 4879 24114 32961
<i>auratum</i> Miq.	Froes Froes Lindeman Lindeman Little Maguire Maguire et al Williams Williams-Alston Forest Dept.	65 102 3735 6489 34 23886 48030 3945 11074 3301	Brazil Brazil Surinam Surinam Ecuador Surinam Brazil Peru Venezuela Guyana	27352H 27373H 32933 32939 24370 11938 20237 19908 18338 32919 3651 43740
<i>cainito</i> L.	Commercial Commercial Commercial Cooper-Slater Cooper-Slater Forest Service Forgeson Fors Gill-Whitford IICA Kluge Schiffino Shank Shank Skutch Stern et al	3 264 247 103 19 77 89 Z-38 49 4 38 116 1330 853	Panama Puerto Rico Costa Rica Panama Panama Haiti Panama Cuba Cuba Costa Rica Panama Dominican Rep. Nicaragua Nicaragua Guatemala Panama	3210 3597 11702 10617 32902 19577 50964 13786 9100 24771 7248 35155 46831 46902 33864H 55104
<i>marginatum</i> (H. & A.) Radlk.	Bosques-Yerb. Curran Curran Lindeman-de Haas Venturi	314 691 713 1009 18	Argentina Argentina Argentina Brazil Argentina	13706 1702 1719 32977 22803H
<i>mexicanum</i> Brand, ex Standl.	Castillo Maderas Trop. Skutch Williams	21 20 1333* 8643	Belize Mexico Guatemala Mexico	21482 47915 22983H 34647

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Table 1.--Wood specimens of Chrysophyllum examined--con.

Species	Collector and number	Origin	Number of wood collection	
			MADw	SJRw**
<i>nitidum</i> G.F.W. Mey	Forest Dept. 4757**	Guyana	3653	46443
<i>oliviforme</i>	Bucher sn	Cuba		16139
	Caldwell 8731	Florida	1283	49259
	Field Mus. sn	Puerto Rico	32908	4520
	Fors 192	Cuba	13855	
	Gill-Whitford 41	Cuba		9052
	Gill-Whitford 84	Cuba		9095
	Gillis 11983	Bahamas	28438	
	Judd 2594	Hawaii		32252
	Marts-Smith sn	Florida	12902	
	Miller 1645	Puerto Rico	20872	
	Rhoads 8314	Florida	9340	49051
	Scarff 11	Dominican Rep.		35301
	Scott sn	Florida	13541	
	Stern 140	Florida		49466
	Stern-Brizicky 383	Florida		51187
	Stern-Brizicky 420	Florida		51216
	Wilson 15	Florida	15959	
	10th Census 135	Florida		5179
<i>ovale</i> Rusby	Schunke 4630	Peru	33040	
<i>panamense</i> Pittier	Cooper 353	Panama	32898	11946
	Stork 1669	Costa Rica		38464
	Wurdack-Adderley 43679	Venezuela		54437
<i>revolutum</i> Mart. and Eichl.	Williams 5522	Peru	16345	18766
	Williams 6140	Peru	16346	18910
	Williams 6655	Peru	32904	19029
	Williams 6900	Peru	16343	19097
<i>unassigned</i>	Acosta-Solis 6394	Ecuador		45158
	Acosta-Solis 6456	Ecuador		45202
	Field Museum 15011	Puerto Rico		10911
	Kluge 19	Belize		7574
	Krukoff 6605	Brazil	12562	36762
	Maguire et al 54831	Surinam	22773	
	Pittier 309	Venezuela		8295
	Woytkowski 5	Peru		37792
	Commercial 29	Honduras	23098	

* Wood doubtfully of this species or genus.

** The MADw and SJRw are different and do not belong in this genus.

*** Wood number with H are from the Harvard Wood Collection.

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Table 2.--Silica content of some *Chrysophyllum* species

Species	Collector		Country	Silica*
				Pct
cainito	Shank	116	Nicaragua	0.25
marginatum	Lindeman-de Haas	1347	Brazil (Parana)	0.54
oliviforme	Caldwell	8731	Florida	0.25
panamense	Stork	1669	Costa Rica	0.96
revolutum	Williams	6140	Peru	1.13

* Based on ovendry weight of the wood.

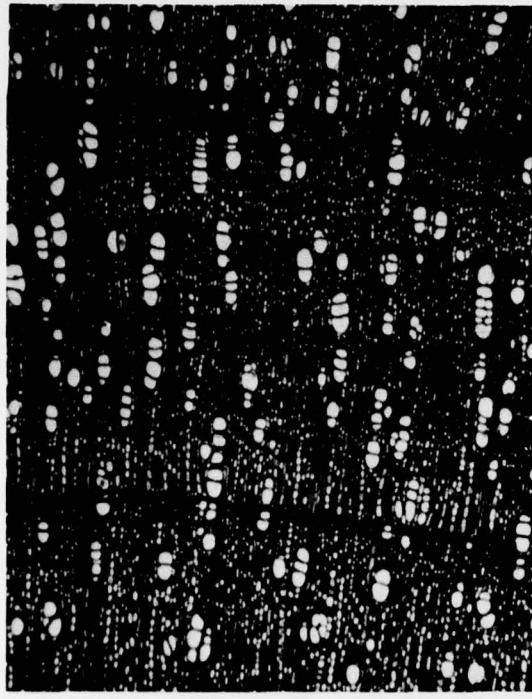


Figure 1.--*C. oliviforme*, showing distinct growth rings and typical pore and parenchyma arrangement (Stern 140) X 30.

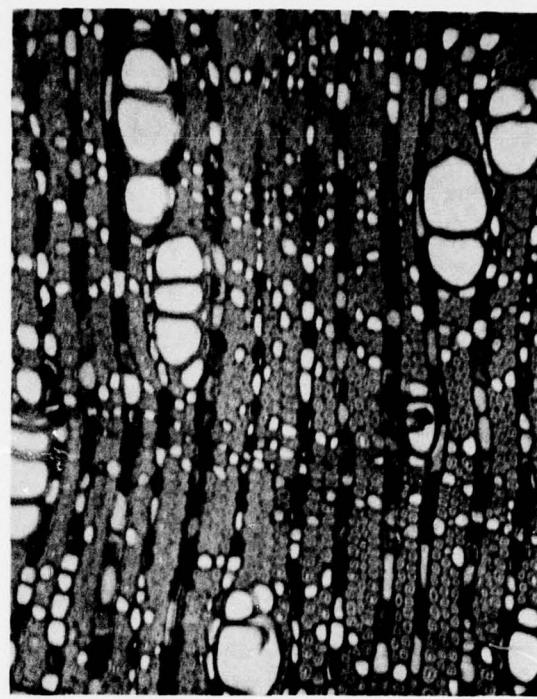


Figure 2.--*C. oliviforme*, but showing parenchyma detail. X 110.

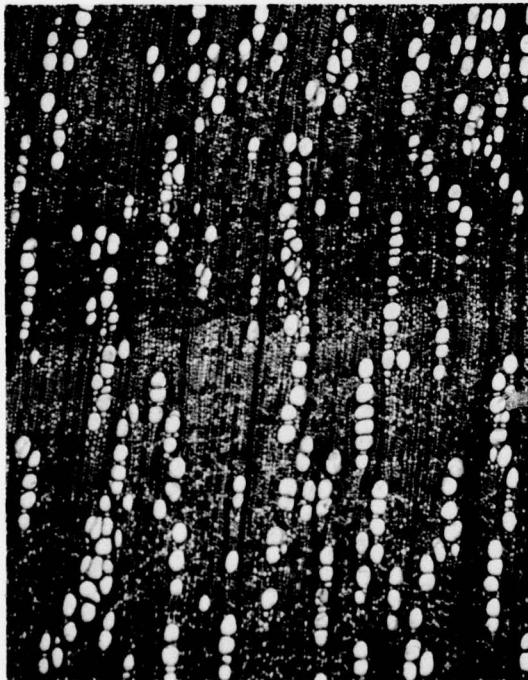


Figure 3.--*C. marginatum* showing radial-echelon arrangement of pores. (Venturi 18) X 30.

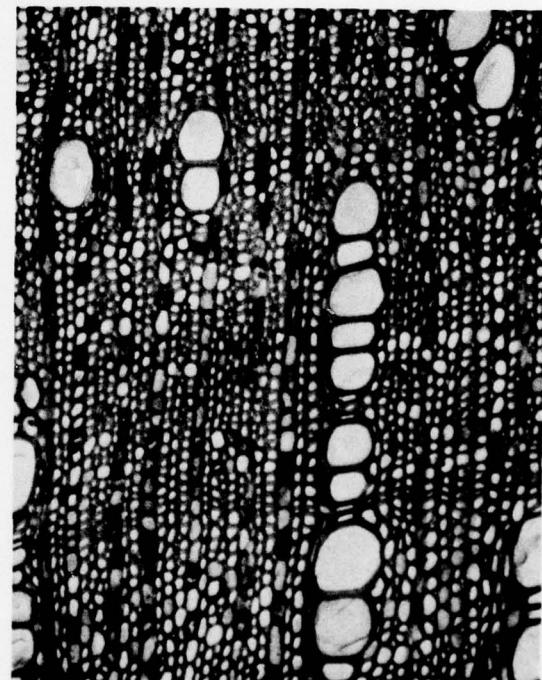


Figure 4.--*C. marginatum* but showing parenchyma detail. X 110.

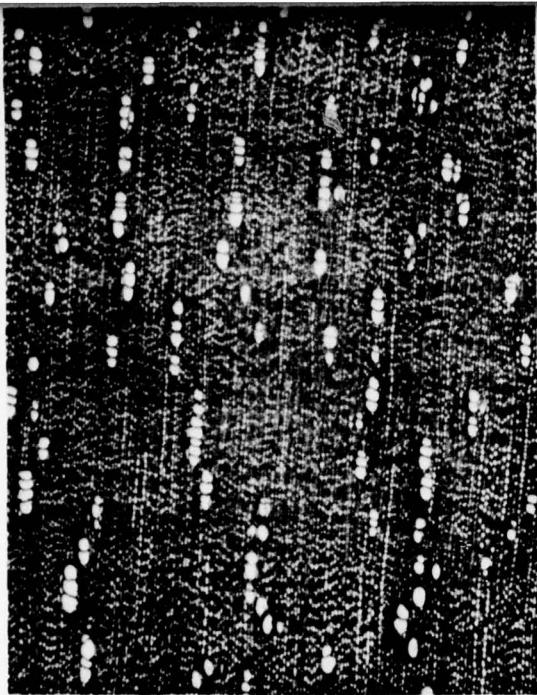


Figure 5.--*C. acreanum* showing general arrangement of pores and parenchyma and the very small pores of this species (Krukoff 5593) X 30.

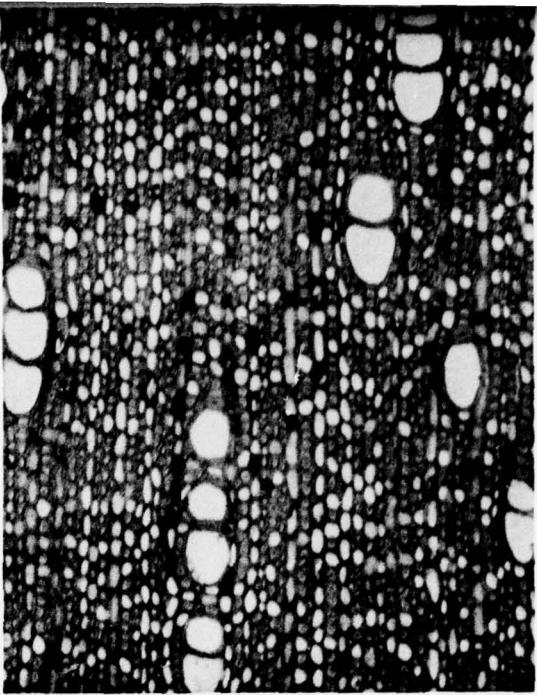


Figure 6.--*C. acreanum* but showing parenchyma detail. X 110.

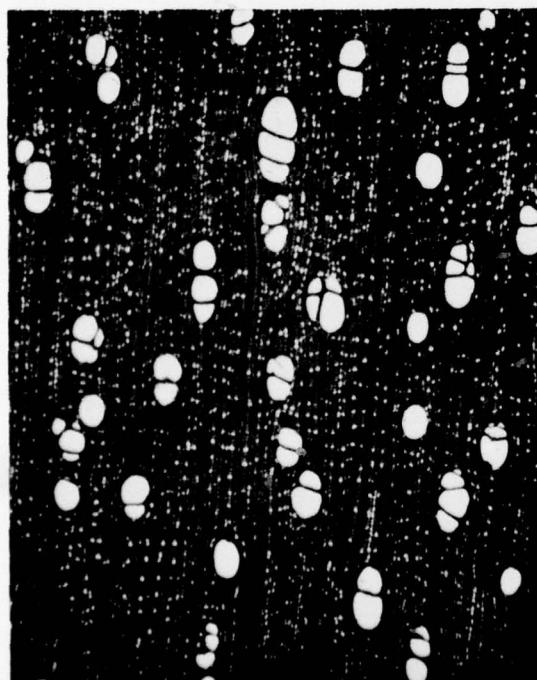


Figure 7.--*C. cainito* showing general arrangement of pores and parenchyma and the large pores of this species. (Forgeson 19) X 30.

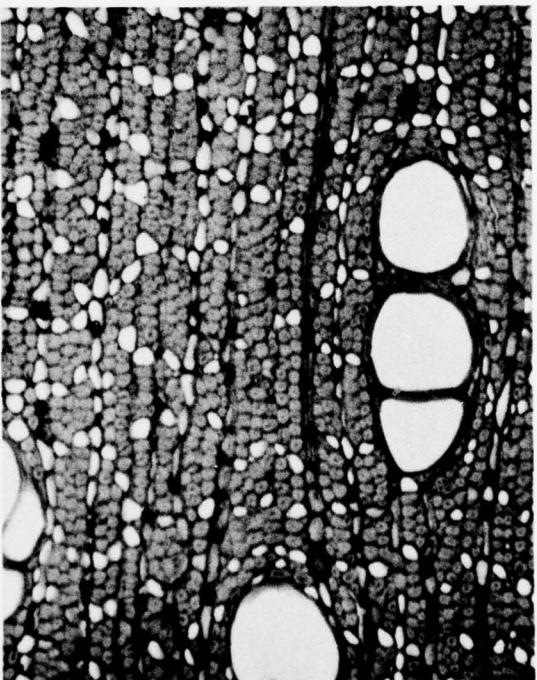


Figure 8.--*C. cainito* but showing parenchyma detail. X 110.